REMARKS

Claims 1 to 12 are in the application and are rejected under 35 U.S.C. §102(b) as anticipated by Tsuboi, et al. The comments made in the Office Action have been considered and the claims have been amended in order to more clearly define the invention and to better distinguish it over the prior art. Also, the specification has been amended in order to cure language defects and to improve the description of the invention. Specifically, claims 1 and 5 of the application are amended herein in order to more clearly define the invention as involving an improved linear motor system that includes first and second linear motors 1 and 2, each being mounted to respective relatively movable elements I and I` in such manner that a primary side, including a coil, of a first linear motor 1, and a secondary side O` of a second linear motor 2 are mounted to one of first or second movable elements I or I', and a primary side, including a coil, of the second linear motor 2 and a secondary side O of the first linear motor 1 are mounted to the other of the first and second movable elements I or I' (see Fig. 1).

As a result of the invention it is possible to generate a large thrust force without increasing the thickness of the linear motor and the length of the respective linear motors in the direction in which the respective first or second elements move.

Contrariwise, Tsuboi, et al. '708 discloses an arrangement in which a primary side, including a coil, of a first linear motor and a primary side, including coil, of a second linear motor are mounted to one or the other of first and second movable elements, and a secondary side of the first linear motor and a secondary side of the second linear motor are mounted to the other of the first and second movable elements.

In other words, it is respectfully submitted that the rejection of the claims in the application as being anticipated under 35 U.S.C. §102(b) by Tsuboi, et al. is incorrect because the apparatus described by Tsuboi, et al., et al. is simply one wherein two linear motor driven sliders 12 are adapted to move in unison along an elongated track rail 11 for moving a table, or the like, along a base. In the reference device the two linear motors each have their primary sides on separate movable elements which are both adapted to move in the same stationary element. This is seen to contrast with the invention defined in the claims wherein a first linear motor 1 has a primary side on one movable element I and its secondary side O on another movable element I` while a second linear motor 2 has its primary side on the movable element I` containing the secondary side of the first linear motor 1 and its secondary side O` on the movable element I containing the primary side of the first linear motor.

It is submitted that for the forgoing reasons, the claims in the application define apparatus that clearly distinguishes over the device in shown in the Tsuboi, et al., et al. reference. The claims are thus submitted as being patentable over the references and therefore allowable.

The Examiner is accordingly respectfully requested to favorably consider this Amendment and to allow the application.

If, for any reason, it is believed that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**."

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Version with markings to show changes made

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VERSION WITH MARKINGS TO SHOW CHANGES MADE 10/022,265

IN THE SPECIFICATION:

The paragraph beginning at page 1, line 7, was replaced with the following rewritten paragraph:

In recent technology, a positioning table for performing a positioning through guidance of a linear motion of a table has been widely utilized for, or applied to, machine tools, industrial robots, and [the] like, machines or mechanisms.

The paragraph beginning at page 1, line 12, was replaced with the following rewritten paragraph:

According to an increased requirement for operating the table at a high speed, a linear motor has been often utilized in place of a ball screw as a driving source. In general, the linear motor is provided with a movable element as a primary side and a stator as a secondary side. The primary movable element is given [with] a thrust (force) by the change of a field (magnetic field) and then linearly moves on the secondary side stator.

The paragraph beginning at page 1, line 20, through page 2, line 1, was replaced with the following rewritten paragraph:

In order to move [fast] the table fast, it is desired for the linear motor to generate a large thrust force. There is known, as a linear motor having an increased large thrust force, a linear motor in which a pair of primary movable elements disposed on both sides of a single secondary stator so as to sandwich the same therebetween.

The paragraph beginning at page 2, line 7, was replaced with the following rewritten paragraph:

An object of the present invention is to substantially eliminate the defect or drawback encountered in the prior art and to provide a linear motor system capable of generating a large thrust force without increasing [a] the thickness of the structure thereof and also provide a driving apparatus provided with such linear motor system as a driving source.

The paragraph beginning at page 4, line 1, was replaced with the following rewritten paragraph:

In a case where linear D.C. motors are used for the first and second linear motors in the above linear motor system, in which a distance between the secondary side magnets is short, there may [cause] be caused a [defective] defect of operation because of the generation of an A.C. magnetic field between magnets. According to the preferred embodiment of the above aspect of the present invention, however, [the] a linear induction motor or linear pulse motor [in which] having no magnet means is utilized as the secondary side, so that no alternating magnetic field is generated. However, a linear D.C. motor may be utilized as far as there is adopted a structure in which the distance between the secondary sides of the first and second linear motors can be made relatively large.

The paragraph beginning at page 5, line 23, through page 6, line 9, was replaced with the following rewritten paragraph:

In a preferred embodiment of this aspect, the driving apparatus may further comprises first and second guide units for guiding the second movable element in the relatively movable direction with respect to the first movable element, the first guide unit being provided for the first movable element and the second guide unit being provided for the second movable element, and wherein the first linear motor generates a thrust force at a position which is substantially the same position of the first guide unit in the relatively movable direction, and the second linear motor generates a thrust force at a position which is substantially the same position of the second guide unit in the relatively movable direction.

The paragraph beginning at page 6, line 20, was replaced with the following rewritten paragraph:

The first and second linear motors are composed of linear induction motors or linear pulse motors respectively, in which the secondary sides of the respective linear induction motors are arranged so as to oppose [to] each other.

The paragraph beginning at page 11, line 4, was replaced with the following rewritten paragraph:

One of the primary movable elements I of the first linear motor 1 is mounted to one longitudinal [one] end, i.e. a front (left side, as viewed) end, and on an upper surface of the outer rail 7, one of the stators O' of the second linear motor 2 existing on the longitudinal extension of the movable element I so as to be continuous thereto.

The paragraph beginning at page 11, line 10, was replaced with the following rewritten paragraph:

On the other hand, the movable element I' of the second linear motor 2 is mounted to one longitudinal [one] (rear side) end of the lower surface of the inner rail 8, and a stator O of the first linear motor 1 existing on the longitudinal extension of the movable element I' so as to be continuous thereto. [Suction] Attraction forces are generated between the movable element I and the stator O and between the movable element I' and the stator O', respectively, through the excitation of the linear motors 1 and 2. Further, in the described arrangement, the second linear motor 2 is assembled with the first linear motor 1 in a reversed state.

The paragraph beginning at page 11, line 22, through page 12, line 5 was replaced with the following rewritten paragraph:

With reference to the illustration of Fig. 1, the outer rail 7 has a [box-shaped (⊐ shaped)] sectional shape as a box U-shape having an upper opening, called the recessed portion 7a, hereinlater. The recessed portion 7a is defined, at both longitudinal [end] sides, by projected ridges (side wall sections) 7b, 7b, extending in parallel to each other in the longitudinal direction. The ridges 7b, 7b each [has] have an inner wall surface to which one ball rolling groove 11 is formed, along the longitudinal direction thereof, as a rolling member rolling surface.

The paragraph beginning at page 12, line 6, was replaced with the following rewritten paragraph:

Furthermore, with reference to Fig. 2, the outer rail 7 is provided, at its one (front) end, with an outer rail side guide unit 3 as first guide means for guiding the longitudinal movement of the inner rail 8 with respect to the outer rail 7. This outer rail side guide unit 3 is composed of a number of balls 13, 13, --- as rolling members rolling between the inner rail 8 and the outer rail 7 and an outer rail side ball circulation passage 14 along which the balls 13 circulate. The structure of this outer rail side ball circulation passage 14 will be described hereinlater.

The paragraph beginning at page 12, line 17, through page 13, line 2, was replaced with the following rewritten paragraph:

At the time of assembling, the inner rail 8 is inserted into the recessed portion 7a of the outer rail 7 so as to be supported between the ridges 7b, 7b of the outer rail 7 through the guidance of the outer rail side guide unit 3 and inner rail side guide unit 4. The inner rail 8 has a [box-shaped (⊐ shaped)] sectional shape as a box U-shape having a lower opening, called recessed portion 8a, hereinlater. The inner rail 8 has outer side surfaces 8c, 8c opposing to inside surfaces 7c, 7c, and loaded ball rolling grooves 15, 15 are formed to the outer side surfaces 8c, 8c so as to correspond to the ball rolling grooves 11, 11 of the ridges 7b, 7b of the outer rail 7.

The paragraph beginning at page 13, line 3, was replaced with the following rewritten paragraph:

On the other [one] side end (rear side end) opposing to the outer rail side ball circulation passage 14, there is formed the inner rail side guide unit 4 as second guide means for guiding the

longitudinal movement of the inner rail 8 with respect to the outer rail 7.

The paragraph beginning at page 13, line 8, was replaced with the following rewritten paragraph:

The inner rail side guide unit 4 and the outer rail side guide unit 3 are arranged along the longitudinal direction of the inner rail 8 or outer rail 7. The inner rail side guide unit 4 is formed with a number of balls 12, 12 --- rolling between the inner rail 8 and the outer rail 7 and an inner rail side ball circulation passage 16 along which the balls 12 circulate. Further, the outer rail side guide unit 3 is formed to one end portion of the outer rail 7, and on the other hand, the inner rail side guide unit 4 is formed to one end of the inner rail 8. Accordingly, these outer and inner rails 7 and 8 are assembled from directions along which both [are] do not interfere with each other.

The paragraph beginning at page 15, line 11, was replaced with the following rewritten paragraph:

The ball return passages A are formed respectively through drilling working effected in the longitudinal direction from the ends of outer rail body 7d and inner rail body 8d. The respective direction changing passages B of the outer rail side ball circulation passage 14 and the inner rail side ball circulation passage 16 are formed [to] in deflectors 19, which are to be mounted to the inner rail body 8d and the outer rail body 7d as members independent therefrom.

The paragraph beginning at page 16, line 13, through page 17, line 6, was replaced with the following rewritten paragraph:

As shown in Fig. 2, the outer rail body 7d is drilled from the side portions by means of an end mill, for example, to thereby form holes 33, through which the deflector 19, such as shown in Fig. 3, is inserted and mounted to the outer rail 7. The inserted deflector 19 is firmly fixed to the outer rail body 7d by using fixing means such as bonding material. The hole 33 is formed so as to penetrate the ball return passage A and extend to the ball rolling groove 11 or loaded ball rolling groove 15. The hole 33 is also formed therein with a staged portion 33a abutting against the abutment portion 29 of the deflector 19. The outer periphery of the deflector 19 is fitted to the holes 33 [till] until the abutment portions 29 [abuts] abut against the staged portions 33a in the holes 33, thus positioning the deflector 19 with respect to the outer rail body 7d or inner rail body 8d. The positioning of the deflector 19 makes it possible to surely scoop the balls 12 or 13 from the ball rolling groove 11 or loaded ball rolling groove 15 and surely return the balls 12 or 13 to the ball return passage A.

The paragraph beginning at page 17, line 6, was replaced with the following rewritten paragraph:

Furthermore, the inner rail body 8d is also drilled from the side portions thereof by means of an end mill, for example, so as to form holes 33 into which the deflector 19 is fitted and mounted to the inner rail body 8d. Further, it is to be noted that, in the described embodiment, although the outer rail body 7d is drilled from its outer side portions and the inner rail body 8d is drilled from

its inner side portions to form the holes 33, it is of course possible to form the holes 33 from the inner side portions of the outer rail body 7d and the outer side portions of the inner rail body 8d.

The paragraph beginning at page 19, line 19, was replaced with the following rewritten paragraph:

The stator O is formed with stationary teeth (stator teeth) 65 which extend in a direction perpendicular to the longitudinal direction of the stator O. The stationary teeth 65 have a substantially [⊐-shaped] box U-shape section in each tooth and being arranged with equal pitch along the entire length direction thereof. Like this stator O, the respective magnetic poles 61 to 64 are formed with magnetic pole teeth 61a to 64a with the same pitch as that of the stator O, respectively.

IN THE CLAIMS:

Claims 1 and 5 were **AMENDED** as follows:

1. (Amended) A linear motor system comprising:

a first linear motor having a primary side, including a coil, being mounted to either one of first and second movable elements which are relatively movable with respect to each other; and

a [secondary] second linear motor having a secondary side mounted to said one of the first and second movable elements so as to extend in the relatively movable direction to be continuous to said primary side of the first linear motor,

said second linear motor having a primary side, including a coil, mounted to another one of the first and second movable elements, and

said first linear motor having a secondary side mounted to said another one of the first and second movable elements so as to extend in the relatively movable direction to be continuous to said primary side of the second linear motor.

5. (Amended) A driving apparatus comprising:

first and second movable elements which are relatively movable with respect to each other; and

a driving unit for giving driving power to said first and second movable elements,

said driving unit being [comprising] a linear motor system, which comprises:

a first linear motor having a primary side, including a coil, being mounted to either one of the first and second movable elements which are relatively movable with respect to each other; and

a [secondary] second linear motor having a secondary side mounted to said one of the first and second movable elements so as to extend in the relatively movable direction to be continuous to said primary side of the first linear motor,

said second linear motor having a primary side, including a coil, mounted to another one of the first and second movable elements, and

said first linear motor having a secondary side mounted to said another one of the first and second movable elements so as to extend in the relatively movable direction to be continuous to said primary side of the second linear motor.